Name:

at1205p_quadratic_optimization (v0)

Adam's probability (a) of making a basketball shot is a function of distance (x) in feet.

$$a(x) \;=\; 0.82 - 0.02x$$

Betty's probability (b) of making a basketball shot is also function of distance (x) in feet.

$$b(x) \;=\; 0.85 - 0.03x$$

(*Technically, these functions are only accurate representations when x is between 0 feet and 28 feet.*)

Adam and Betty are playing a minigame. Adam chooses a location from where both players will attempt a shot. If Adam makes the shot and Betty misses the shot, then Adam wins. The probability that Adam wins (w) is a function of distance. (See *compound probability of independent events* and also *complementary probability* for why we are multiplying $a(x)$ by $(1 - b(x))$.)

$$w(x) \;=\; a(x) \cdot (1 - b(x))$$

We can substitute the functions' expressions.

$$w(x) \;=\; (0.82 - 0.02x) \cdot (1 - (0.85 - 0.03x))$$

After a bit of distribution and rearrangement, you could produce the following equivalent equation.

$$w(x) \;=\; -0.0006x^2 + 0.0216x + 0.123$$

1. What distance should Adam choose in order to maximize his chance to win?
2. If Adam chooses that optimal distance, what is his chance to win?